Space Weather Forecast

Issued on Monday 24 February 2025 at 01:06 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate flares likely. Possible glancing CME Day 1 (24 Feb).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was High with one Strong-class flare peaking at 23/1927 UTC, most likely from a region that has recently rotated around the northwest limb. The risk from this region will ease over the next 24 hours. There are now nine sunspot regions on the visible disc. The most notable regions are in the southwest quadrant and in the northwest quadrant. The region in the southwest has shown spot development, increasing in penumbral area, with mixed magnetic polarities in the intermediate portion. The region in the northwest developed rapidly at first although this has now stalled, showing some slight decay in its intermediate spots. However, there remains clear magnetic complexity in the trailing portion. The other regions on the disc do not currently appear particularly complex.

A coronal mass ejection (CME) was observed off the northwest limb in association with the Strong flare, but is unlikely to have any Earth-directed impact.

Solar Wind / Geomagnetic Activity: Solar winds showed background conditions. Wind speeds varied between 300-360 km/s. Interplanetary Magnetic Field was weak at first, rising to moderate late on 23 Feb with a possible transient CME arrival. The north-south component also varied weakly at first, increasing to moderate late on. Geomagnetic activity was Quiet to Unsettled (Kp1-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was near or just very slightly above normal background levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate solar activity is forecast, with isolated M-flares considered likely and a slight chance of X-flares.

Solar Wind / Geomagnetic Activity: There are two main CMEs in the forecast at present. The first may have arrived as a transient feature late on 23 Feb, with the second forecast to reach Earth during Day 1 (24 Feb). Overall, confidence in the CME forecast remains low, however recent observations from Solar Orbiter suggest the second CME could be stronger than the first. Wind

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speeds are currently at background levels. Late Day 1 or Day 2 (24-25 Feb) a weak coronal hole fast wind may occur, with wind speeds perhaps reaching around 400-450 km/s.

Geomagnetic activity is forecast to be mainly Quiet to Unsettled (Kp1-3), but activity may increase to give a chance of G1/Minor Storm (Kp5) and a slight chance of G2/Moderate Storm (Kp6) intervals early on Day 1, this risk increasing further with any second CME arrival later Day 1. Activity gradually reducing back to Quiet from Day 2 (25 Feb).

Energetic Particles / Solar Radiation: The count rate of energetic particles may rise to S1/Minor radiation storm levels on Day 1 in response to the recent Strong flare. In the absence of any increase from this event, background levels are expected to persist, but with a continued slight chance of increasing above the S1/Minor radiation storm threshold in response to any larger flares.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	50	20	5	5
Strong	G3	No	10	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	Yes	70	70	70	70
Very Active	R3-R5 (X Class)	Yes	10	10	10	10

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	50	15	15	15
Very Active	**≥ S3 ***	No	2	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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